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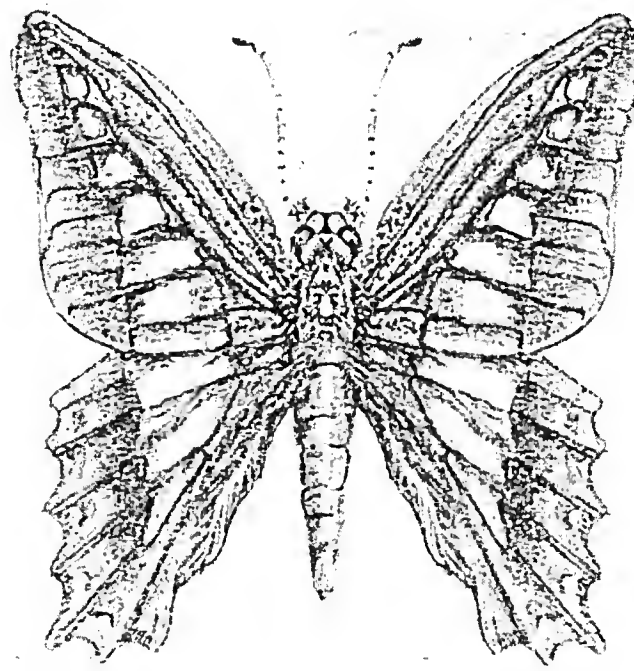

News Bulletin of The Entomological Society of Victoria Inc.

THE ENTOMOLOGICAL SOCIETY OF VICTORIA (Inc)

MEMBERSHIP

Any person with an interest in entomology shall be eligible for Ordinary membership. Members of the Society include professional, amateur and student entomologists, all of whom receive the Society's News Bulletin, the Victorian Entomologist.

OBJECTIVES

The aims of the Society are:

(a) to stimulate the scientific study and discussion of all aspects of entomology,
(b) to gather, disseminate and record knowledge of all identifiable Australian insect species,
(c) to compile a comprehensive list of all Victorian insect species,
(d) to bring together in a congenial but scientific atmosphere all persons interested in entomology.

MEETINGS

The Society's meetings are held at La Trobe University, 2nd Floor, Room 2.29, 215 Franklin Street, Melbourne (Opposite the Queen Victoria Market) Melway reference Map 2F B1 at 8 p.m. on the third Friday of even months, with the possible exception of the December meeting which may be held earlier. Lectures by guest speakers or members are a feature of many meetings at which there is ample opportunity for informal discussion between members with similar interests. Forums are also conducted by members on their own particular interest so that others may participate in discussions.

SUBSCRIPTIONS

Ordinary Member	$20.00 (overseas members $22)
Country Member	$16.00 (Over 100 km from GPO Melbourne)
Student Member	$12.00
Associate Member	$ 5.00 (No News Bulletin)

Associate Members, resident at the same address as, and being immediate relatives of an ordinary Member, do not automatically receive the Society's publications but in all other respects rank as ordinary Members.

Cover design by Alan Hyman.

Cover illustration of the Blue Triangle butterfly, *Graphium sarpedon* L. by Rhonda Millen.

MINUTES OF THE GENERAL MEETING, 21 JUNE, 2002

Present: A. Kellehear, C. Peterson, G. Weeks, , D. Stewart, R. McMahon, , J Tinetti, P. Carwardine, , D. Dobrosak, L. Garnett, K. Dunn, R. Vagi, T. Tantar, J. Deutscher, N Peck, P. Marriot

Apologies: I. Endersby

Minutes: Minutes of the general meeting 19/04/02 were accepted. M: G. Weeks S: D. Stewart

Editor's Report:
The editor requires more papers for the *Vic Ent.*

Correspondence:

- Circular 97 from the Society for Insect Studies (NSW) was tabled.
- Journal of the Entomological Research Society VOLUME 4, PART 1, 2002 from Turkey was tabled. It includes a paper on Australian leaf beetles by Hawkeswood and Jolivet (see page 60 of this issue).

General Business:
Visitors Tereza Tantar and John Deutscher were welcomed

Speaker:

Kelvyn Dunn made a video presentation on "Aspects of the behaviour of Butterflies of Cape York Peninsula". Material was shot on a recent trip to the Daintree- Cape Tribulation area prior to the rainy season. The video included 39 species of butterfly filmed during January 2002 in varied habitats on Cape York Peninsula, including early stages of 11 species, as well as undescribed larval and pupal colour forms of an unidentified *Graphium* species found near Weipa. Other features included: perched males of *Yoma sabina*; below-canopy leaf litter feeding by a female *Vindula arsinoe*; several *Graphium macfarlanei* males feeding at lantana; a *Papilio ambrax* male repeatedly feeding at mud; in situ oviposition and full life history *of Bindahara phocides*; *Eurema alitha* male sheltering during a cloud burst, young larvae of *Philiris sappheira manskei*; shelters, larvae, pupae and male adult of *Hesperilla sexguttata*; and the full life history of *Jalmenus eichhorni* along with its attendant ant, *Iridomyrmex sanguineus* (near Andoom). A number of other ant-associated lycaenid larvae were illustrated in situ, and their attendant ants were named based on CSIRO identifications of preserved vouchers.

The President thanked Kelvyn.

Meeting closed 9.48pm.

MINUTES OF THE COUNCIL MEETING, 19 JULY, 2002

Meeting opened 8.02 pm

Present: D. Dobrosak, I. Endersby, A. Kellehear, D. Stewart, J. Tinetti , P. Carwardine

Minutes: It was agreed to accept the minutes of the meeting before last

Correspondenee:

- A brochure was received from Kallara Conference centre. It outlined facilities available.
- Perth Books sent their booklist. A mail order service is available.
- Following the recent excursion to Occan Grove, the Society received a letter of thanks from the local scout group.

Treasurer's Report:
Account balances are: General account $6552: Le Souëf account $3641

Editor's Report:
Submissions for next issue are in hand. Envelopes and stickers have been purchased

General Business:

1 Speakers for the rest of the year
The program was discussed with a view to finalising arrangements

2. The Society pamphlet
Ideas for a revised version of the pamphlet were tabled. A mock up for a new version will be prepared by D. Dobrosak for the next meeting.
Wider advertising issues will be discussed at the next Council meeting

4. Exeursion proposal
Alan Kellehear's invitation to Glen Luce, near Castlemaine, for an excursion was accepted. A date in November will be confirmed at the September meeting.

Meeting closed 9.20 pm.

Publication list of William Nigel Balcombe Quick, 1928-2002

Michael F. Braby

The late Nigel Quick joined the Entomological Society of Victoria when it was reformed by Zoo Le Souëf in 1961, after having been in recess since 1941, and was Vice-President from 1973 to 1976. In 1971, he started writing articles for the *Victorian Entomologist*, the Society's journal or News Bulletin as it later became known in 1985. Over the ensuing 28 years he contributed 51 articles (totalling 134 pages). He also published three papers (totalling 23 pages) in the *Victorian Naturalist, Queensland Naturalist* and *Australian Journal of Entomology*. His most productive period was during the early and mid-1970's when he handled the publication of the journal and for several issues was assistant editor. Most publications dealt with the natural history of butterflies, novel methods of setting, preserving and rearing specimens, and technical aspects of the ENTRECS scheme, a computerised distribution database that he pioneered in the mid-1970's. However, he also wrote on a range of other topics, including species protection and conservation, book reviews and field trip reports; one interesting article deals with the stag beetle, *Phalacrognathus muelleri*.

His most important scientific contributions were undoubtedly the discovery and documentation of the life histories and general biology of a number of butterflies for which the early stages and larval food plants were unknown or very poorly known. Foremost among these were *Trapezites phigalia, Sabera dobboe, Delias ennia, Oreixenica correae, Lucia limbaria, Acrodipsas cuprea, Arhopala centaurus, Ogyris idmo halmaturia, Pseudalmenus chlorinda zephryus, Candalides heathi, Danis danis* and *Neolucia hobartensis*. But he studied and reared many species from Victoria and northern Queensland and accumulated a substantial amount of original (unpublished) biological data, especially on the geographic distribution, larval food plant and ant associations, some of which was incorporated in three important books on Australian butterflies: McCubbin's (1971) *Australian Butterflies*, Common and Waterhouse's (1972, 1981) *Butterflies of Australia*, and Braby's (2000) *Butterflies of Australia: their Identification, Biology and Distribution*. For example, he was the first to discover (and to date possibly only person to rear) the life histories of the rare lycaenids *Philiris diana diana* and *Candalides consimilis goodingi*. His knowledge and captive rearing of a colony of the locally endangered *Acrodipsas myrmecophila* from Ocean Grove in his garden at Glen Waverley in the 1960's was legendary. Nige described the subspecies *Ogyris oroetes apiculata* Quick, 1972 from southern Australia, produced in 1972 a checklist of the Australian butterfly fauna, compiled a seminal report on butterfly dispersal during the 1973-74 flight season, and contributed greatly to a co-authored paper on the use of common names. Perhaps Nigel's most significant publication was the production, in collaboration with Paul Gullan, David Crosby and Museum Victoria, of a CD-ROM on the butterflies of Victoria. Published in 1996 and copiously illustrated with photographs and databased plot maps, this was another pioneer development and represented the culmination of a life long interest in the field, summarising a vast amount of information on the distribution and larval food plants of Victorias' then recognised 119 species. He planned to produce a book on Victorian butterflies, similar to that of Fisher's (1978) *Butterflies of South Australia*, but sadly this dream was never realised.

In 1979, he was made an Honorary member of the Entomological Society of Victoria in recognition of his pioneering work on the ENTRECS scheme. However, he subsequently resigned from the Society, mainly because of poor health, and contributed very few articles after 1985.

A more detailed biography of Nige will appear in the August issue (Vol. 38, Part 3) of *Myrmecia* (News Bulletin of the Australian Entomological Society) and the October issue (Vol. 119, Part 5) of the *Victorian Naturalist* (Journal of the Field Naturalists Club of Victoria). Nige's publications are listed below in chronological order.

Quick, W.N.B., 1971. Some effects of abnormal climatic conditions on the butterfly *Oreixenica correae* Olliff. *Victorian Ent.* **1(2)**: 6-7.

McCubbin, C. and Quick, W.N.B., 1971. Control Burning - long term effects on understory [sic] flora and associated insect fauna, &c. *Victorian Ent.* **1(2)**: 8-11.

Quick, W.N.B., 1972. A check-list of Australian Mainland & Tasmanian Rhopalocera. Entomological Society of Victoria, Melbourne. pp. i-ii, 1-11. [author announced in Vol. 2, No. 3, p. 3 of *Victorian Ent.*]

Quick, W.N.B., 1972. A new race of the butterfly, *Ogyris oroetes*. A new geographical race of *Ogyris oroetes* Hewistson 1862 (Lepidoptera, Family Lycaenidae, sub-family Ogyrinae). *Victorian Nat.* **89**: 107-111.

Quick, W.N.B., 1972. Description of the larval and pupal stages of *Lucia limbaria* Swainson, the 'Small Copper'. (Lepidoptera, family Lycaenidae). *Victorian Ent.* **2(1)**: 5, **2(3)**: 13. 2 pls.

Quick, W.N.B., 1972. Some notes on the life history of *Pseudalmenus myrsilus zephyrus* Waterhouse & Lyell 1914 (Lepidoptera, family Lycaenidae.) [sic] The "Victorian Hairstreak". *Victorian Ent.* **2(1)**: 6-8.

Quick, W.N.B. and McCubbin, C.W., 1972. The phigalia skipper, *Trapezites phigalia* Hewitson (Lepidoptera, subfamily Trapezitnae). *Victorian Ent.* **2(2)**: 7-8, **2(3)**: 13. **2** pls.

Quick, W.N.B., 1972. Collected *Ogyris idmo waterhouseri. Victorian Ent.* **2(3)**: 9-10.

Quick, W.N.B., 1972. Preparation of wings, palpi, etc. of Lepidoptera for micro-photography and microscopic examination. *Victorian Ent.* **2(3)**: 11-12.

Quick, W.N.B., 1972. *What Butterfly was That?* Review. *Victorian Ent.* **2(6)**: 21-23.

Quick, W.N.B., 1973. Early stages of the "Mountain Blue", *Neolucia hobartensis hobartensis* (Miskin) 1890 (Lepidoptera - Lycaenidae). *Victorian Ent.* **3(1)**: 9-10.

Quick, W.N.B., 1973. Notes on the early stages of the "Rayed Blue", *Candalides heathi heathi* (Cox) 1873 (Lepidoptera - Lycaenidae). *Victorian Ent.* **3(1)**: 10-12.

Bishop, A.D. and Quick, W.N.B., 1973. Notes on breeding Victorian butterflies. *Victorian Ent.* **3(2)**: 7-13.

Quick, W.N.B., 1973. Mt. Baw Baw, March 4, 1973. *Victorian Ent.* **3(2)**: 14-15.

Quick, W.N.B., 1973. An unusual Dart-tail. *Victorian Ent.* **3(2)**: 17.

Quick, W.N.B., 1973. Cleaning stained butterfly specimens. *Victorian Ent.* **3(3)**: 10.

Quick, W.N.B., 1973. Excursion to Philip Island, 15th July, 1973. *Victorian Ent.* **3(4)**: 4-5.

Quick, W.N.B., 1973. The Big Desert - September 15-17, 1973. *Victorian Ent.* **3(5)**: 15-18.

Quick, W.N.B., 1973. Letters to the Editor. An apology. *Victorian Ent.* **3(6)**: 3-4.

Quick, W.N.B., 1974. Butterfly rearing - obtaining eggs. *Victorian Ent.* **4**: 6-7.

Quick, W.N.B., 1974. Early stages of the butterfly *Norothuro oraxes eupolis* (Miskin) (Lepidoptera: Lycaenidae). *Victorian Ent.* **4**: 23-24.

Quick, W.N.B., 1974. Secretary's report. 1973-1974. *Victorian Ent.* **4**: 43-44.

Quick, W.N.B., 1974. Under the mistletoe. *Victorian Ent.* **4**: 49-52.

Quick, W.N.B., 1974. The Big Desert - September, 1974. *Victorion Ent.* **4**: 60-61.

Quick, W.N.B., 1974. Some abnormal insect records for the summers of 1972-3, 1973-4. *Victorion Ent.* **4**: 66-71.

Quick, W.N.B., 1974. Setting Lepidoptera, Odonata, &c. *Victorion Ent.* **4**: 79.

Quick, W.N.B., 1975. A review of butterfly protection and conservation. *Victorion Ent.* **5**: 110-114.

Quick, W.N.B., 1975. Distribution data recording programme. (Entrecs). *Victorian Ent.* **5**: 137-138.

Quick, W.N.B., 1975. Availability of ENTRECS cards. *Victorian Ent.* **5**: 140-141.

Quick, W.N.B., 1976. Book Review. *Birdwing Butterflies of the World. Victorion Ent.* 6: 4-6.

Quick, W.N.B., 1976. A further note on 'relaxing' fluids. *Victorion Ent.* 6: 30-31.

Quick, W.N.B., 1976. Wandering larvae. *Victorion Ent.* **6**: 38.

Quick, W.N.B., 1976. The distribution of *Oreixenico lathoniella herceus* in Victoria. *Victorian Ent.* **6(5)**: 39-40.

Quick, W.N.B., 1977. Report on the ENTRECS Programme. *Victorion Ent.* **7**: 11-12.

Quick, W.N.B., 1977. A *Hesperillo idothea* puzzle. *Victorian Ent.* **7**: 13.

Quick, W.N.B., 1977. A weekend in the alpine country - March 5-6, 1977. *Victorian Ent.* **7**: 14-21.

Quick, W.N.B., 1977. *Pseudodipsas cuprea* in Victoria. *Victorian Ent.* **7**: 26-29.

Quick, W.N.B., 1977. Letter to the Editor. The Treasurer. *Victorion Ent.* **7**: 32.

Quick, W.N.B., 1977. Requests for information: insect fauna of the north-central province of Victoria: *Victorian Ent.* **7**: 43.

Quick, W.N.B., 1978. ENTRECS data bank: identification of butterfly species. *Victorian Ent.* **8**: 14.

Quick, W.N.B., 1979. Obituary. *Victorion Ent.* **9**: 1. [Ted Harris]

Quick, W.N.B., 1982. *Delias ennia nigidius* Miskin - its host plant and some early stages. *Victorian Ent.* **12**: 40-41.

Quick, W.N.B., 1982. Some notes on the early stages of the skipper *Sabera dobboe outoleon* (Miskin) *Victorion Ent.* **12**: 44-45.

Quick, W.N.B., 1982. Early stages of *Delios ennio nigidius* Miskin. *Victorion Ent.* **12**: 52-53.

Quick, W.N.B., 1982. Kuranda (occasional) Chronical. *Victorian Ent.* **12**: 55-59.

Quick, W.N.B., 1984. Audible stridulation in pupae of *Hypochrysops digglesii* (Hewitson) (Lepidoptera: Lycaenidae). *Victorian Ent.* **14**: 4-5.

Quick, W.N.B., 1984. Notes on the longevity of *Phalacrognatlus muelleri* Macleay (Coleoptera: Lucanidae, Lampriminae), 'The Golden Stag'. *Victorian Ent.* **14**: 23-25.

Quick, W.N.B., 1985. *Anisynta albovenata* in Victoria? *Victorian Ent.* **15**: 56-57.

Quick, W.N.B., 1985. The ENTRECS data bank. *Victorian Ent.* **15**: 58.

Quick, W.N.B., 1985. Altimeters for entomologists, naturalists, bushwalkers. *Victorian Ent.* **15**: 80.

Quick, W.N.B., 1993. A migration of *Lampides boeticus* (Linnaeus), the pea-blue butterfly (Lepidoptera: Lycaenidae). *Victorian Ent.* **23**: 125.

Quick, W.N.B., 1994. Early stages of *Danis danis serapis* Miskin, 1891 (Large Green-banded Blue) (Lepidoptera: Lycaenidae). *Qd Nat.* **33**: 39-40.

Gullan, P.K., Crosby, D.F. and Quick, W.N.B. 1996. *Victorian Butterfly Database*. CD-ROM. Viridans Biological Databases, Melbourne.

Braby, M.F., Atkins, A.F., Dunn, K.L., Woodger, T.A. and Quick, W.N.B., 1997. A provisional list of common names for Australian butterflies. *Aust. J. Entomol.* **36**: 197-212.

Quick, W.N.B., 1998. Selection of pupal site by larvae of *Trapezites symmomus* (Lepidoptera: Hesperiidae). *Victorian Ent.* **28**: 10.

Conjecture on cossid preservation and techniques for setting cossid moths.

E. D. Edwards, 56 Lachlan St, Macquarie, ACT. 2614.

The excellent condition of many specimens of Cossidae (wood moths) collected by F.P. Dodd between about 1890 and 1914 and now in the State Museums in Australia, the Australian National Insect Collection and the Natural History Museum, London has always impressed me. The wings on the specimens are often precisely horizontal even after a century in collections and certainly glue was not used. Of course Dodd reared the specimens and set them while fresh after de-gutting them to prevent them going greasy and to help them dry more quickly. He may also have used some artificial heat to dry them although his comments on how long they took to dry on the setting boards suggest that he did not (Dodd, 1916). Nor did he allow maggots to feed on the flight muscles as he said that the moths on the boards must be protected from Diptera as they will loosen the wings. Dodd enjoyed setting specimens and on excursions such as his visit to Darwin in 1908 F.P. Dodd did the setting while his son, Walter, did the field work (Monteith 1991). Dodd collected specimens for sale and sometimes may not have revealed all he knew about foodplants and other "commercially sensitive" details. Did Dodd have a secret method of setting cossids?

At the same time as F.P. Dodd was collecting in Brisbane he was acquainted with Dr T.P. Lucas, a medical practitioner and butterfly and moth collector also living in Brisbane (Monteith 1991). Lucas developed an ointment (and other remedies) based on extracts from the pawpaw and the ointment is still commercially available today. Lucas was much impressed by the properties of the pawpaw and even wrote a booklet about his experiences with the medical efficacy of his remedies (Lucas, 1914?). Pawpaw is well known today as a source of the very active enzyme, papain, which breaks down protein. This protease is extracted from the dried latex obtained by wounding the green fruit but the raw dried latex is very active in its unrefined form. It has been used in meat tenderisers and in digestive supplements. Lucas (1906) did recognize that pawpaw was an aid to digestion and that it contained a "ferment". This term "ferment' was used at that time for what we would now call an enzyme.

It is possible that Lucas may have recognized that a pawpaw extract could aid in setting large moths by breaking down the strong flight muscles. But it is not clear what year he developed his pawpaw remedies in and they may have been developed later than the 1890s when Dodd set many of his cossids. Lucas' own setting (specimens in the South Australian Museum) was not very good which suggests that he used no special technique. If Lucas did not use papain in setting then I doubt that he would have suggested it to Dodd and it is unlikely that Dodd would have recognized the potential if Lucas did not. On reflection it seems unlikely that Dodd used a pawpaw extract in setting. But even if Dodd did not use it would it be useful?

I have used "digestive enzymes" for some time as an aid in setting large cossid moths and will continue to use them under the impression that they make setting much easier. It is very difficult to conduct objective experiments on something as subjective as the ease of setting moths. Nor have I attempted to standardise the dose of enzymes delivered. The concentration of enzymes in the digestive pills probably varies from batch to batch and brand to brand. The degree to which the enzymes have become denatured over time probably depends on how long the pills have been on the shelf. Papain can lose activity fairly rapidly with age and if in contact with metals but there are probably supplements in the pills to increase shelf life and also to act as a buffer. The quantity of distilled water in which the contents of each capsule is suspended and the quantity actually injected are also important but unmeasured. Currently my use of digestive enzymes is entirely "unscientific" but I am publishing this note because I would be interested in other collectors' impressions if they try the technique. Specifically I am interested to know if others find it worthwhile, if any discoloration is caused to the thoracic vestiture and if wings are found to sag some time after the specimens have been removed from the setting boards.

I have only used the technique on dried, pinned specimens. I have only used it with cossids and large hesperiids. Essentially, my procedure is as follows. Specimens are put in the relaxing jar for 24 hours or overnight. This relaxes the antennae and appendages but is too short a time to relax the flight muscles. The moths are then injected in the thorax with a small amount of water just off the boil using a standard reusable syringe. Water is injected until it just starts to seep out near the bases of the wings. Shake the specimen vigorously to shake off extruded drops of water. Prepare a suspension containing digestive enzymes by placing the contents of one capsule in 2 or 3 ml of distilled water and shaking well. Let the larger particles settle to the bottom (they will block the needle too easily) and draw off about 1 ml of the suspension remaining. Inject this into the thorax shortly after the boiling water injection, again until tiny drops appear at the bases of the wings. Again shake the specimen. A fairly large diameter needle is needed or it will block up too easily and too frequently. Return the specimen to the relaxing jar and stand for about 30 minutes or more and then set the moth. Great care is needed to prevent the specimen becoming wet but this does not matter with greasy cossids (they become wet extremely easily) as they will be subsequently degreased. The suspension of digestive enzymes will not keep for long and it should all be used promptly although it may keep a few days in the refrigerator but I have not tried this. Fresh latex, still liquid, may be much easier to use but is not available in southern Australia but could be easily used in northern Australia.

I degrease cossid specimens by bathing them in ethyl acetate after setting and while they are still on the setting "boards". They are not de-gutted as it destroys too many useful taxonomic characters. I have special setting "boards" for cossids which are made from stainless steel sheet but otherwise are the standard shape for normal setting boards. The top surfaces are lined with 2mm thick slices of balsa which are glued to the metal (polyvinyl acetate (PVA) glue will do, for example, aquadhere). Squares of blotting paper are used to hold down the wings when they are in position. Pins are used to pin down the blotting paper but these fine pins develop hooked tips when forced through the paper and balsa onto the stainless steel. These pins I use only with the metal "boards" as the hooked tips tear normal boards and setting paper too much. The moths are allowed to dry on the setting "board" for about 2 weeks and the whole "board" is then immersed in ethyl acetate to degrease the specimens while they are still on the "board". They remain immersed in ethyl acetate, which is in a large plastic food container, for a week. On removal they are dried, while still on the "board", in a fume cupboard (or in the open air) and the scales on the body are then fluffed up with a small paint brush so that they do not look like they have been wetted. They are then removed from the "board" when all the ethyl acetate has evaporated.

Capsules of digestive enzymes may be obtained from any health-foods shop. These capsules usually contain a series of enzymes including a lipase, alpha amylase, cellulase, lactase and another protease as well as papain. It is possible that the other protease is just as effective as the papain. Meat tenderiser may also be easily available but I have not found it in supermarkets in Canberra.

References

Dodd, F.P., 1916. Notes on the great Australian Cossidae. *Études de Lépidoptérologie comparée*. **XI bis**: 33-37.

Lucas, T.P., 1906. Domestic Medicine. How to live and how to avert and cure disease. 334pp. Edwards, Dunlop and Co., Brisbane.

Lucas, T.P., 1914? The most wonderful tree in the world. The papaw (Carica papaia). 86pp. Carter-Watson Co., Brisbane.

Monteith, G.B., 1991. The butterfly man of Kuranda. Frederick Parkhurst Dodd. 34pp. Queensland Museum, Brisbane

Male-Male Coupling in *Heteronympha penelope* Waterhouse (Lepidoptera: Nymphalidae: Satyrinae)

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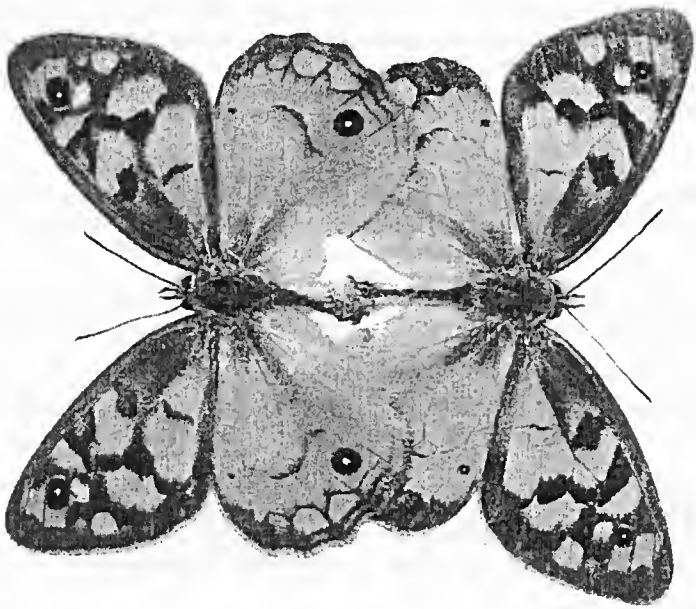
It was with interest when I read the recent article on same-sex butterfly couplings by Dunn (2001), as during all the years of my interest in butterflies I had never witnessed such a phenomena. Yet, less than three months later, I stumbled upon such a coupling between two male *Heteronympha penelope* in the Grampians area of western Victoria on 23 March 2002.

The initial sighting was of what appeared to be a single injured butterfly weakly flapping around on the ground, but I soon realised there were two butterflies involved. When I picked them up, they were quite weak and near death, (and actually died soon after). I immediately thought they were of a normal coupling that had been injured by a bird, and could not understand while they had not separated, but I eventually twigged that two males were involved. Unfortunately for them, the coupling process in *H. penelope* requires the production of a sphragis, so at the end of their coupling they had both attempted to produce a sphragis, and in doing so they inseparably glued themselves together with sphragis material, which ultimately caused their death by starvation. Both males were in new condition.



References

DUNN, K.L. 2001. An apparent same-sex mating in Australian *Catopsilia* (Lepidoptera: Pieridae). *Vict. Ent.* **31**(6): 101-106.

Galvanised Iron Sheets as Microhabitat for Ground Active Invertebrates

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Introduction

One of the items commonly found on the ground around old or abandoned European dwellings in rural Australia is metal, generally in the form of old galvanized iron sheets. With programs such as "Keep Australia Beautiful" there has been a move to tidy up such debris. However, some herpetologists view iron sheets as a good collecting place for reptiles, and this raises the question as to whether such artificial shelters provide an alternative microhabitat and whether they are important because of the reduction in natural microhabitats. This report presents results from a small project on the assessment of iron sheets as habitat for invertebrates.

Methods

The project was conducted in mallee bushland located approximately 1.5 km north of the Inglewood Post Office on the north side of the Calder Highway, Victoria. The area has been heavily disturbed since European settlement, primarily by gold mining. Two sites were selected for study. Site 1 had been searched for gold in the past, had minimal inorganic debris, and considered was less disturbed. Site 2 was located 50 m from site 1, and contained an abandoned dwelling. It had a considerable amount of inorganic debris, primarily sheets of galvanised iron and some smaller scraps of tin on the ground.

Field work was conducted on 1 and 4 October 1989. In each site, an area of 30 x 30 m was selected. The major microhabitats on the ground (iron sheets, rocks and wood) were examined for invertebrates beneath. In site 1, 14 rock samples and 13 wood samples were obtained, while in site 2, nine iron sheet samples and four rock samples were taken. Invertebrates were collected by hand from beneath these microhabitats and preserved in 70% ethanol. The dimensions of the microhabitat were taken. Litter samples were taken using a plastic sieve (size 45 x 27 cm) and shaking the leaf and fine woody debris and emptying it into a white plastic tray; invertebrates were then collected by hand.

All samples were sorted to the ordinal level using Harvey and Yen (1989), and then further sorted into 'morphospecies'. No attempt was made to identify them to actual species.

Due to the different collecting techniques (direct searching beneath microhabitats and litter sieving), the different sizes of the sampling units, the differing number of samples, and the lack of information on the previous short-term history of these microhabitats, the information presented is only taken as indicative of possible effects and no statistical analyses are undertaken.

Results and conclusions

Sampling from the wood, rock, tin microhabitats and litter in the two sites resulted in a collection of 2,443 individuals that comprised 70 morphospecies of invertebrates from 16 orders (Table 1).

As the nature of wood, rock and tin cover was very different from litter, these three microhabitats are considered first. Representatives of 35 invertebrate morphospecies from 12 orders were found beneath rocks, wood and iron sheets from both sites. The dominant order in terms of species richness was Hymenoptera (19 species), of which 18 were species of ants. There were three species each of spiders (Araneae) and cockroaches (Blattodea), two species each of centipedes (Scolopendrida) and termites (Isoptera), with one species of earthworms (Haplotaxida), scorpion (Scorpionida), woodlouse (Isopoda), millipede (Polyxenida), bug (Hemiptera), beetle (Coleoptera) and one non-ant Hymenopteran. Twenty species of the 35 collected (55.6%) were social insects (ants and termites). A total of 2,013 individuals was collected, although 1,882 (93.5 %) of these were social insects. Except for earthworms, all other orders had less than 10 individuals.

In terms of distribution across the microhabitats, iron sheets had most species (22), while rocks had a total of 20 and wood had 9 species. However, the mean number of species beneath each type of microhabitat was much more similar: rocks had a mean of 1.4-2 species, wood had 1.6 species and iron sheets had 0.7 species (Table 1).

Litter is a different type of microhabitat because it does not provide the solid cover that wood, rocks or iron sheets provide. However it is included in this study because some invertebrate species may use the litter for foraging and shelter beneath the other microhabitat types. A total of 47 invertebrate morphospecies was collected in litter, although the number of individuals was relatively low (412). This is due to social insects locating their nests beneath the larger rock, wood or iron microhabitats or underground rather than in the litter itself.

When the invertebrate morphospecies are examined for microhabitat fidelity, 9 morphospecies were found only beneath rock, 10 only beneath iron, none only beneath wood, and 32 only collected in litter (Table 2). A total of 19 morphospecies were collected in more than one type of microhabitat: 5 morphospecies in rocks or wood and litter, 5 in iron sheets and litter, 4 in rocks and wood, and the remaining 5 morphospecies were widespread across rocks, wood, iron and litter (Table 2).

When the number of individuals found beneath each microhabitat is considered, rocks had 980 (mean = 70.0) in site 1 and 178 (mean = 44.5) in site 2, wood had 332 (mean = 25.5) and iron sheets had 538 (mean = 18.6).

There were considerable differences in the sizes of rocks, logs and iron sheets. The mean size (in terms of area of ground covered) for rocks was 201.9 cm^2, wood was 197.5 cm^2, and iron sheets was 4644.4 cm^2. When the number of species/microhabitat and the number of individuals/microhabitat are converted number/m^2 to correct for differences in sizes, the number of species is 70.8/ m^2 for rocks in site 1 and 30 in site 2, 82.0/m^2 for wood and 4.5/m^2 for iron sheets, and the number of individuals is 3466.7/m^2 for rocks in site 1 and 663.1/m^2 in site 2, 1293.3/m^2 for wood and 39.9/m^2 for iron sheets.

This indicates that although the number of species found beneath iron sheets was higher than the number found beneath rocks or wood, the density of species beneath rocks and logs is much higher once differences in areas are taken into account.

These results suggest that rocks and rotting wood are preferred microhabitats over iron sheets for invertebrates. There could be several reasons for this. First, rocks and wood provide better insulation from temperature extremes compared to iron sheets, and the animals would not suffer the extremes of cold or heat. Secondly, rocks last longer than wood and over time, could develop more complex assemblages of flora and fauna; the iron sheets are more likely to be subjected to

disturbance from human fossickers. Thirdly, wood is a source of food and can develop more complex faunal assemblages.

Iron sheets may still be important in areas where natural habitat factors have been reduced or destroyed, as was the case in site 2. They have to be considered in conjunction with factors such as litter because in this study, litter supports a high species richness of invertebrates. There are fewer nests for social insects such as ants and termites in litter, and these insects probably depend more upon the larger microhabitats such as rocks, wood and in some cases, iron sheets, as shelter for their colonies. Some thought has to be given when there are attempts to clean up the Australian environment in terms of whether the items being removed are replacing some original component of the habitat that has been either removed or depleted since European settlement.

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References

Harvey, M.S. & Yen, A.L. 1989. Worms to Wasps: An Illustrated Guide to the Terrestrial Invertebrates of Australia. Melbourne: Oxford University Press.

Table 1. The number of species (s) and individuals (n) collected from beneath rocks, wood and iron sheets and in leaf litter.
s = number of species; n = number of individuals.

Invertebrate order	Site 1						Site 2					
	Rocks		Wood		Litter		Iron		Rocks		Litter	
	s	n	s	n	s	n	s	n	s	n	s	n
Haplotaxida	0	0	0	0	0	0	1	11	0	0	0	0
Scorpionida	0	0	0	0	1	1	1	5	0	0	0	0
Araneae	0	0	2	2	9	22	1	2	0	0	6	11
Acarina	0	0	0	0	1	1	0	0	0	0	1	1
Isopoda	0	0	0	0	0	0	1	10	0	0	0	0
Scolopendrida	2	2	1	1	0	0	1	9	1	1	0	0
Polyxenida	0	0	0	0	0	0	1	1	0	0	0	0
Thysanura	0	0	0	0	1	5	0	0	0	0	1	3
Blattodea	0	0	1	1	3	17	4	22	0	0	5	17
Isoptera	2	7	1	12	2	20	2	202	2	36	0	0
Orthoptera	0	0	0	0	0	0	1	1	0	0	0	0
Embioptera	0	0	0	0	0	0	0	0	0	0	1	1
Hemiptera	0	0	0	0	3	4	1	2	0	0	3	3
Coleoptera	0	0	0	0	3	5	1	1	1	1	3	4
Diptera	0	0	0	0	0	0	0	0	0	0	2	2
Hymenoptera	11	971	4	316	12	94	7	275	3	140	3	201
Total	15	980	9	332	35	169	22	541	7	178	25	243
Number of samples	14		13		13		29		4		5	
Mean number per sample	1.4	70	1.6	25.5	2.7	13	0.7	18.7	2	44.5	5	48.6
Mean area microhabitat (sq m)	0.02		0.02		0.12		0.46		0.07		0.12	
Estimated number/sq m.	70.8	3466.7	82	1293.3	22.1	107	1.5	40	30	663.1	41.2	398.5

Table 2. Distribution of morphospecies between microhabitats

Taxon	Site 1			Site 2		
	Rocks	Wood	Litter	Tin	Rocks	Litter
Haplotaxida sp 1				X		
Scorpionida sp 1			X	X		
Araneae sp 1		X	X			
Araneae sp 2			X			X
Araneae sp 3						X
Araneae sp 4			X			
Araneae sp 5				X		
Araneae sp 6		X	X			X
Araneae sp 7			X			X
Araneae sp 8			X			
Araneae sp 10			X			X
Araneae sp 11			X			X
Araneae sp 12			X			
Acarina sp 1						X
Acarina sp 2			X			
Isopoda sp 1				X		
Scolopendrida sp 1	X	X		X	X	
Scolopendrida sp 2	X					
Polyxenida sp 1				X		
Thysanura sp 1			X			X
Blattodea sp 1		X		X		
Blattodea sp 2				X		X
Blattodea sp 3				X		X
Blattodea sp 4			X	X		X
Blattodea sp 5			X			X
Blattodea sp 6			X			X
Isoptera sp 1	X	X	X	X	X	
Isoptera sp 2			X		X	
Isoptera sp 3	X			X		
Orthoptera sp 1				X		
Embioptera sp 1						X
Hemiptera sp 1				X		X
Hemiptera sp 2						X
Hemiptera sp 3			X			
Hemiptera sp 4			X			X
Hemiptera sp 5						X
Hemiptera sp 6			X			X
Coleoptera sp 1			X	X	X	
Coleoptera sp 2			X			
Coleoptera sp 3			X			X
Diptera sp 1						X
Diptera sp 2						X
Hymenoptera (non-ant) sp 1	X		X			
Hymenoptera (ant) sp 1	X					
Hymenoptera (ant) sp 2	X					
Hymenoptera (ant) sp 3			X			
Hymenoptera (ant) sp 4	X					
Hymenoptera (ant) sp 5				X		
Hymenoptera (ant) sp 6			X	X	X	
Hymenoptera (ant) sp 7		X	X	X	X	
Hymenoptera (ant) sp 8	X	X				X
Hymenoptera (ant) sp 9				X		
Hymenoptera (ant) sp 10	X					
Hymenoptera (ant) sp 11			X		X	X
Hymenoptera (ant) sp 12	X					
Hymenoptera (ant) sp 13	X					
Hymenoptera (ant) sp 14	X	X				
Hymenoptera (ant) sp 15				X		
Hymenoptera (ant) sp 16			X			
Hymenoptera (ant) sp 17		X	X			
Hymenoptera (ant) sp 18			X			
Hymenoptera (ant) sp 19	X					
Hymenoptera (ant) sp 20				X		
Hymenoptera (ant) sp 21				X		
Hymenoptera (ant) sp 22						X
Hymenoptera (ant) sp 23			X			
Hymenoptera (ant) sp 24	X					
Hymenoptera (ant) sp 25			X			
Hymenoptera (ant) sp 26			X			
Hymenoptera (ant) sp 27			X			

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Peter S Gillespie, Laurence A Mound and Chin-Ling Wang: Austro-oriental genus *Parabaliathrips* Priesner (Thysanoptera: Thripidae), with a new Australian species forming male aggregations

Carlos·HW Flechtmann and Danuta K Knihinicki: New species and new record of *Tetranychus* Dufour from Australia, with a key to the major groups in this genus based on females (Acari: Prostigmata: Tetranychidae)

David Evans Walter, Jennifer J Beard, Ken L Walker and Kathryn Sparks: Of mites and bees: A review of mite-bee associations in Australia and a revision of *Raymentia* Womersley (Acari: Mesostigmata: Laelapidae), with the description of two new species of mites from *Lasioglassum* (*Parasphecodes*) spp. (Hymenoptera: Halictidae).

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Steven G Candy and Susan C Baker: Calculating food consumption in the laboratory: A formula to adjust for natural weight loss.

Susan C Baker, Jane A Elek and Steven G Candy: Comparison of feeding efficiency, development time and survival of Tasmanian eucalyptus leaf beetle larvae *Chrysophtharta bimaculata* (Olivier) (Coleoptera: Chrysomelidae) on two hosts.

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Paul R Grundy and Derek A Maelzer: Augmentation of the assassin bug *Pristhesancus plagipennis* (Walker) (Hemiptera: Reduviidae) as a biological control agent for *Helicoverpa* spp. in cotton.

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